Series Expansions

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Here are some functions and their taylor expansions.

$$\sin(x) = \sum_{k=0}^{\infty} \frac{(-1)^k x^{1+2k}}{(1+2k)!} \qquad \cos(x) = \sum_{k=0}^{\infty} \frac{(-1)^k x^{2k}}{(2n)!}$$

$$\sinh(x) = \sum_{k=0}^{\infty} \frac{x^{1+2k}}{(1+2k)!} \qquad \cosh(x) = \sum_{k=0}^{\infty} \frac{x^{2k}}{(2k)!}$$

$$\frac{1}{1+x} = \sum_{k=0}^{\infty} (-1)^k x^k \qquad e^x = \sum_{k=0}^{\infty} \frac{x^k}{k!}$$

$$(1+x)^\alpha = \sum_{k=0}^{\infty} \binom{\alpha}{k} x^k \qquad \ln\left(\frac{1+x}{1-x}\right) = 2\sum_{k=0}^{\infty} \frac{x^{1+2k}}{1+2k}$$

$$(1-x^2)^n = \sum_{k=0}^{\infty} \binom{n}{k} (-x^2)^k;\ |x| < 1 \qquad \log(1-x) = -\sum_{k=1}^{\infty} \frac{x^k}{k}$$

$$\arcsin(x) = \sum_{k=0}^{\infty} \frac{(2k)! x^{2k+1}}{4^k (k!)^2 (2k+1)} \qquad \arccos(x) = \frac{\pi}{2} - \arcsin(x)$$

$$Note: \binom{\alpha}{k} = \frac{\alpha!}{k!(\alpha-k)!}$$